TOTOKU

Color Calibration Software

Med*i*visor Color

Version 3.1

User's Manual

Contents

TOTOKU

http://www.totoku.com/display/

— Make sure to read this Software License Agreement before use. —

Software License Agreement

Please read this Software License Agreement ("Agreement") thoroughly before using or installing Medivisor Color. By installing this software, you are agreeing to be bound by the terms of this Agreement. If you do not agree to this Agreement, return the entire package with all of its contents along with the purchase receipt to the place of purchase for a full refund.

Article 1 – Definition
1. Software identified above (hereinafter called "Software"), includes documents such as manual and specifications, etc, media, any software and such products delivered by TOTOKU from time to time under this Agreement.
2. Individual Contract means the agreement to be concluded in the form of purchase order, which shall set forth terms and conditions including, but not limited to, (a) identification of Products including model numbers (b) quantity (c) requested shipping date from Japanese port (d) price (e) payment (f) shipping instructions and shipping address.

Article 2 – Order of Precedence
The terms and conditions of this Agreement shall govern Individual Agreement. In case that terms and conditions of Individual Agreement is inconsistent or conflict with the provisions of this Agreement, the provisions of this Agreement shall prevail.

Article 3 – Grant of License
1. TOTOKU hereby grants to User and User accepts non-exclusive and non-transferable license to use, install and copy Software under this Agreement.
2. User shall use Software solely on its computer of the same number as the number of licenses. User shall not sublicense, rent or lease Software or use Software for third-party training, commercial time-sharing or service bureau use.
3. The aforesaid license granted is solely for User's operations on the designated system.

Article 4 – Limitations on License
1.User shall not cause or permit to any third party the reverse engineering, discovering the source code, disassembly, modification, update, customization or recompilation of Software.
2. User shall not use or cause to be used, license granted herein and for any purpose whatsoever other than for the purpose specified in this Agreement.
3. TOTOKU shall retain all title, copyright and other proprietary rights in Software. User shall not acquire any right, express or implied, in Software, other than those specified in this Agreement.

Article 5 – Management of Software
1. Subject to the terms and conditions hereunder, User may copy Software for archival and backup purposes and agree to label all such copies with the copyright notice designated by TOTOKU. User shall manage the copy of Software with the duty of care and diligence of a good manager and, upon TOTOKU's request, shall make a written report to TOTOKU in respect of Software copied.

2. At TOTOKU's written request, User shall furnish TOTOKU with a signed certification verifying that Software are being used pursuant to the provisions of this Agreement. TOTOKU reserves the right at any time to inspect Software at the business premises of User during the term of this Agreement to insure and maintain the quality and efficient management of Software. In case the aforesaid inspection reveals that User has underpaid fees to TOTOKU, User shall be invoiced for such underpaid fees with penalty.

3. User may change its computer where Software is to be installed in subject to prior written consent of TOTOKU.

Article 6 – After Sales Service
After sales service such as reply to inquiry, technical support, training and consulting service for Software shall be provided by TOTOKU or TOTOKU's distributor under the after sales agreement between User and TOTOKU or TOTOKU's distributor.

Article 7 – Warranty
1. Program Warranty
    (1) TOTOKU warrants that Software will perform the functions described in its manual and/or specifications during the term of this Agreement unless (a) Software is modified, disassembled or customized by the parties other than TOTOKU (b) Software is operated in combinations other than as specified in its manual and/or specifications. In addition, TOTOKU shall make its best efforts to make Software free from program error. Provided, however, that TOTOKU shall not warrant that Software is error free and uninterrupted.

    (2) In the case of breach of the foregoing warranty, TOTOKU shall make its best efforts to correct the defect or program errors by providing updated or amended version of Software. In case TOTOKU cannot correct the defect or program errors, TOTOKU may, at its option, terminate this Agreement and any payment previously made to User by TOTOKU will be refunded, less the reasonable value received by User of the use of Software to the date of the aforesaid termination.

2. Media Warranty
    (1) TOTOKU warrants that CD-ROM or other media for Software is free from defects in materials and workmanship under normal use for fourteen (14) days from the date of delivery.

    (2) In the case of breach of the foregoing warranty, TOTOKU shall replace or repair the defective media accordingly. Notwithstanding the aforesaid warranty, in case that any software made by the third party is included in Software, the provisions of the user software license agreement between User and the third party shall be applied in respect of such software.

3. TOTOKU DOES NOT MAKE AND HEREBY DISCLAIMS ANY WARRANTY IN RESPECT OF SOFTWARE OTHER THAN AS PROVIDED ABOVE IN THIS ARTICLE, WHETHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.

Article 8 – Intellectual Property Right
1. User acknowledge that all patents, designs, copyrights, know how and other intellectual property rights used or embodied in connection with Software are the exclusive properties of TOTOKU, and shall not dispute them for any reason whatsoever. User shall not apply for or register any intellectual property right in connection with Software.

2. User hereby agree to advise TOTOKU immediately after User becomes aware that any intellectual property right in connection with Software is attacked or infringed upon by any third party. In the case of aforesaid attack or infringement, User shall cooperate with and aid TOTOKU for the defense proceedings at its own cost, and TOTOKU shall retain all rights to control the direction of any action thereof.

3. To the best knowledge of TOTOKU, Software will not infringe upon any intellectual property right of any third party. Notwithstanding the foregoing, in the case of any claim of infringement or alleged infringement of intellectual property rights brought by third parties in relation to Software, User shall advise, cooperate with and aid TOTOKU for the defense proceedings at its own cost, and TOTOKU shall retain all rights to control the direction of any action thereof.

4. In case that Software is held or believed by TOTOKU or any court of competent jurisdiction to infringe any intellectual property right of any third party, TOTOKU shall have the option, at its expense, to (a) modify Software to be non infringing; or (b) obtain a license for User to continue the deal of Software. If it is not commercially reasonable to perform either of the above options, then TOTOKU may terminate the license for the infringing Software and refund the license fees paid for Software to User, less the reasonable value received by User to the date of the aforesaid termination.

Article 9 – Confidential Information

1. User shall not disclose to third parties any information, which is confidential and proprietary in nature of TOTOKU in respect of Software. Such confidential and proprietary information (hereinafter called as "Confidential Information") includes, but not limited to trade secrets, know-how, inventions, patents, techniques, processes, programs, schematics, data. User agree that Confidential Information shall be kept confidential and shall not be disclosed to any other party without the written consent of TOTOKU.

2. User shall exercise the sole and proper control and supervision over any of their employees and hereby assumes full liability and responsibility of all obligations in connection with any party's employees and any activity of such employees in connection with Confidential Information.

Article 10 – Limitation of Liability

1. To the maximum extent permitted by applicable law, in no event shall TOTOKU or its distributor be liable for any special, incidental, indirect or consequential damages whatsoever including, without limitation, damages for loss of business profits, business interruption, loss of business information or any other pecuniary loss arising out of the use of or inability to use, Software or failure to provide after sales services, even if TOTOKU has been advised the possibility of such damages. In any case, TOTOKU's entire liability under any provision of this Agreement or Individual Contract shall be limited to the amount paid by User for the purchase of Software.

2. Software is not fault-tolerant and is not designed, intended, or licensed for use in hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, and life support or weapons systems, in which the failure of Software could lead directly to death, personal injury, or severe physical or environmental damage (hereinafter called as "High Risk Activities"). Without limiting the generality of the foregoing, TOTOKU specifically disclaim any express or implied warranty of fitness for High Risk Activities.

Article 11 – Export Regulations
User may take Software outside of its own country subject to the prior written consent of TOTOKU. In the case of foregoing, User shall, at its own cost and responsibility, comply with all relevant export laws and regulations of its own country (hereinafter called as "Export Laws") to assure that neither Software nor any related program thereof are (1) exported, directly or indirectly, in violation of Export Laws; or (2) are intended to be used for any purposes prohibited by Export Laws, including, without limitation, nuclear, chemical or biological weapons proliferation.

Article 12 – Taxes
User shall be solely responsible for and shall pay or reimburse TOTOKU for, all taxes, duties, assessments and other governmental charges which are now or hereafter imposed by governmental authority associated with the performance of TOTOKU's obligations under this Agreement.

Article 13 – Duration
1. This Agreement comes into force on the date first written and, unless sooner terminated, shall continue in effect for a period of one (1) year. Provided, however, that in case the parties hereto agreed to the terms and conditions in respect of the renewal or extension of this Agreement in writing prior to the expiration of the term hereof, this Agreement shall be renewed or extended for the term agreed upon.
2. In the event of expiration of this Agreement, the parties hereto shall have no claim against the other party for the loss of good will or future profit.

Article 14 – Termination
TOTOKU may, without prejudice to any other rights or remedies, terminate this Agreement or Individual Contract, if the User fails to perform any provision of this Agreement or Individual Contract.

Article 15 – Effect of termination
If this Agreement is expired or terminated under the terms and conditions herein, the parties hereto shall comply with the followings:
　　(1) The license granted hereunder shall terminate.
　　(2) User shall return to TOTOKU Software, together with all copies, in all forms and whether partial or complete, on all types of media and computer memory, and whether or not modified or merged into other material.
　　(3) User shall delete or remove Software and any such source code from all workstation and/or terminal pursuant to TOTOKU's directions.

Article 16 – Damages
If TOTOKU was damaged or injured due to User's breach or default of any provision hereof or by the termination specified at the subparagraph from (1) to (5) in Article 14, TOTOKU may claim User damages thereof.

Article 17 – Survival
Article 8 (Intellectual Property Right) and 9 (Confidential Information) of this Agreement shall survive the termination or expiration hereof.

Article 18. – Severability
If any provision of this Agreement is held by a court of competent jurisdiction to be illegal or invalid, the remaining provisions hereof shall remain effect.

Article 19 – Force Majeure
Neither parties hereto shall be liable for any delay or failure to perform any of its obligations hereunder, other than the obligation to make any payment which is due, if such delay or failure is due to fire, flood, earthquake, epidemic, unusually severe weather, strike, act of God, or public enemy, public disorder, restriction by civil or military authority in their sovereign or contractual capacities, transportation failure or any other cause beyond the reasonable control of the parties.

Article 20 – Assignment and Delegation
Neither whole of this Agreement nor any part hereof shall be assignable or delegable by any party hereto without other parties' prior written consent, which shall not be unreasonably withheld. In the event of such assignment or delegation, the assigning or delegating party shall remain liable to the other parties and shall not be relieved of any obligation under this Agreement.

Article 21 – Waiver
Failure by any party to require performance by the other parties or to claim a breach of any provision of this Agreement shall in no manner be deemed to be a waiver of such provision or right on any other occasion.

Article 22 – Arbitration
All disputes, controversies or differences that may arise between the parties hereto, out of or in relation to or in connection with this Agreement or the breach hereof which have not been settled by mutual consultation, shall be finally settled by the arbitration. The arbitration shall be held in Tokyo, Japan in accordance with the Commercial Arbitration Rules of The Japan Commercial Arbitration Association. The award to be rendered shall be final and binding upon the parties hereto. Judgment upon such award may be entered in any court having jurisdiction thereof.

Article 23 – Governing Law
This Agreement shall be governed and construed in accordance with the laws of Japan.

Article 24 – Entire Agreement
This Agreement constitutes the entire and only agreement between the parties hereto and supersedes all previous negotiations, agreements and communications with respect hereto, and shall not be released, discharged, changed or modified in any manner, except by instruments signed by duly authorized officers or representatives of each of the parties hereto.

1 Introduction

1.1 Overview

Medivisor Color is a calibration software designed to calibrate the TOTOKU CCL series color displays. Its functions include:

- **Calibration:**
  Calibration to DICOM GSDF and other curves including user-defined curves
- **Verify:**
  Evaluation of conformity of current maximum luminance and gamma with the latest calibration results
- **Manual Luminance Adjustment:** Manual adjustment of luminance
- **Test Pattern:** Visual examination of display characteristics

1.2 Package contents

This product package contains the following items. If anything is missing, please contact your dealer.

	Item	Qty.
1	Medivisor CD-ROM	2
2	Calibration Sensor DTP94	1
3	Counterweight	1
4	Adhesive Gelatin Pad	1

1.3 Operating environment

Computer	IBM PC/AT compatible machine
Operating system	Microsoft Windows XP Professional SP1 or later Microsoft Windows 2000 Professional SP4
Language	English Japanese
Supported TOTOKU display	CCL182 Series CCL202 CCL212 Series CCL316 CCL250i CCL350i
Connectable displays	8 (CCL212 Series, CCL316, CCL250i, CCL350i)
	1 (CCL182 Series, CCL202)

* Minolta USB sensor can be used on CCL182 Series, CCL202, and CCL316. However, DTP94 is recommended for more accurate calibration.

2 Installation

This chapter explains how to connect the cables and install the hardware and software. Make sure to log in as a user with administrative privileges registered with a local computer before starting installation.

If any of the following calibration software is currently installed, make sure to uninstall it now.

- C-Medivisor for CCL182/CCL202
- C-Medivisor for CCL316
- C-Medivisor for CCL182/CCL202/ CCL316
- C-Medivisor for CCL212

Prior to installing Medivisor Color, uninstall software that corrects gamma settings on the graphics card, such as Adobe Gamma Loader that accompanies Adobe Photoshop, or controls video output from the graphics card. Medivisor Color may not be able to calibrate displays properly otherwise.

2.1 Connecting cables

Follow the instructions below to properly connect the communication cable supplied with the display. For detailed information on other cable connections, refer to the display user's manual.

Communication Cable

Computer

To the wall outlet
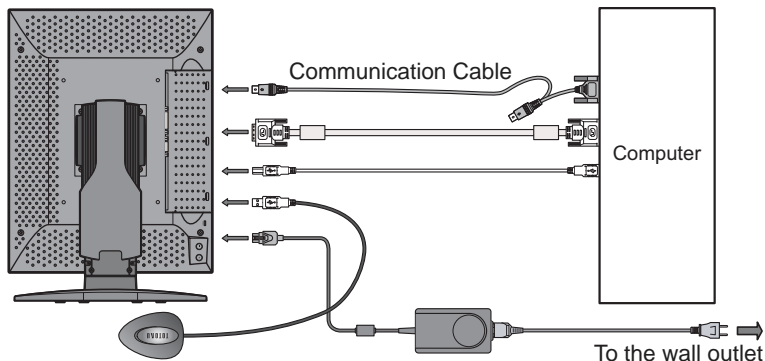
1. **REMOTE IN (PC-LINK)**
   Connect one end of the communication cable supplied with the display to display's **REMOTE IN (PC-LINK)** and the other end to the computer's serial port (RS-232C).

2. **REMOTE OUT**
   When daisy chaining multiple displays, connect one end of the communication cable supplied to first display's **REMOTE OUT** and the other end to second display's **REMOTE IN** and so on.

   Note: Displays with the **SENSOR** port instead of **REMOTE OUT** cannot be daisy chained (see 1.3).

2.2 Installing the calibration sensor driver

1. Connect the supplied calibration sensor DTP94 to the computer's USB port directly or via a USB hub. It will be detected as new hardware and the Found New Hardware Wizard starts up.

2. Insert the supplied CD-ROM Disk 2 in the CD drive on the computer. Though the software installer starts up automatically, go back to the Found New Hardware Wizard and select "Install the software automatically (Recommended)," and click "Next."

> Figures used in this manual are of Windows XP. Screens on your display may appear different depending on the operating system.
>
> The Medivisor Color Installer can be closed or left open.

3. The following screen may appear. Click "Continue Anyway" to proceed with installation.
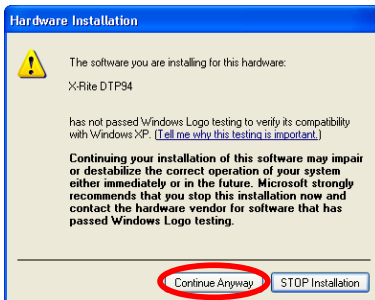
4. Click "Finish" to complete installation.

2.3 Installing Medivisor Color

1. If the Medivisor Installer is left open, click "Install." Otherwise, reinsert the CD-ROM or run **launcher.exe** on the CD-ROM to start the installer and click "Install."
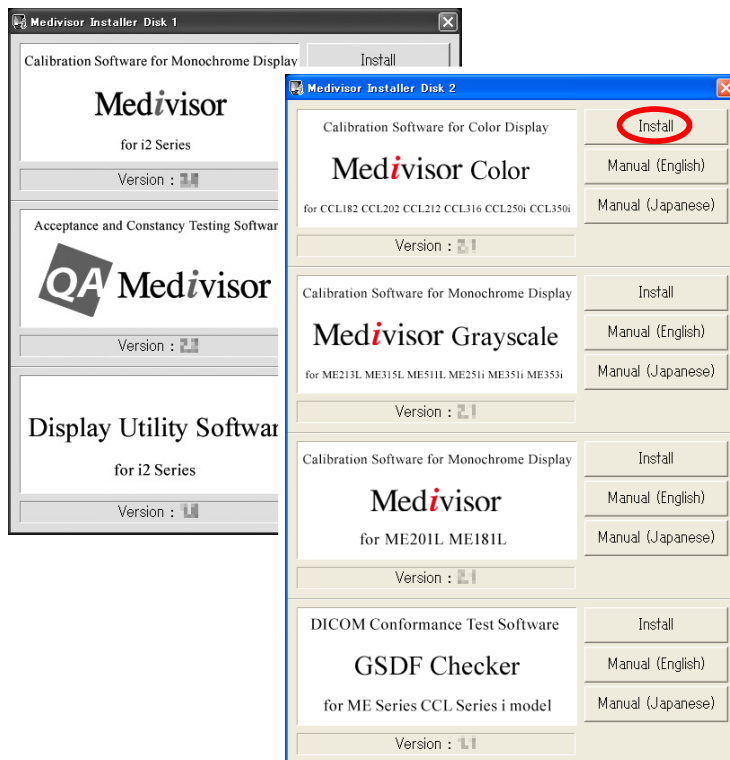
2. When the Medivisor Color version information appears, click "Next."

3. When the Setup Wizard appears, click "Next."
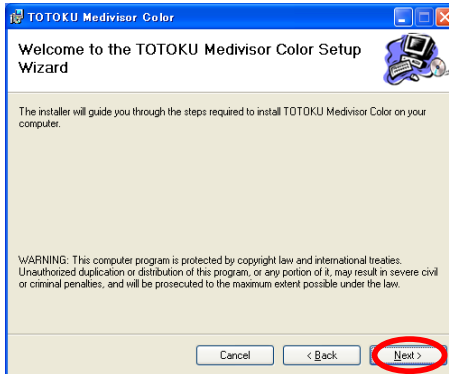
4. The License Agreement screen appears. To accept the agreement and proceed with installation, select "I Agree" and click "Next."
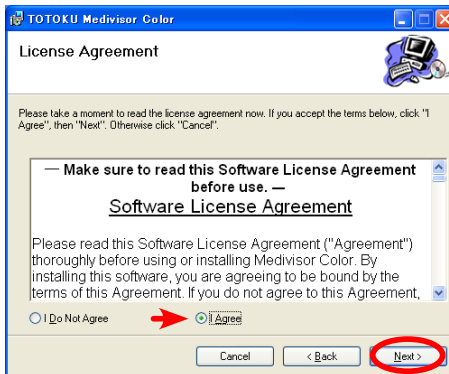
Important

You must accept the agreement to complete installation of Medivisor Color.

5. When the Select Installation Folder screen appears, select a destination folder. Further down the screen is the setting as to where the shortcut to this software should be created. To share it with all users of the destination computer, select "Everyone." To use it by yourself, select "Just me" and click "Next."
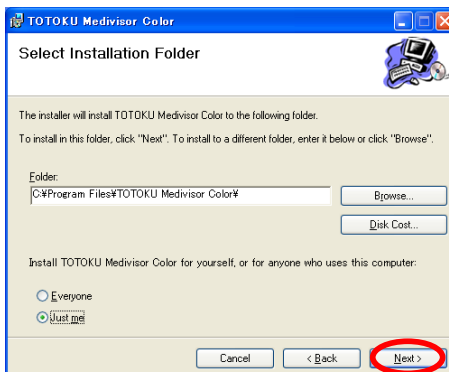
By default, the destination is **C:\Program Files\TOTOKU Medivisor Color**.

6. When the Confirmation Installation screen appears, click "Next" to start installation.
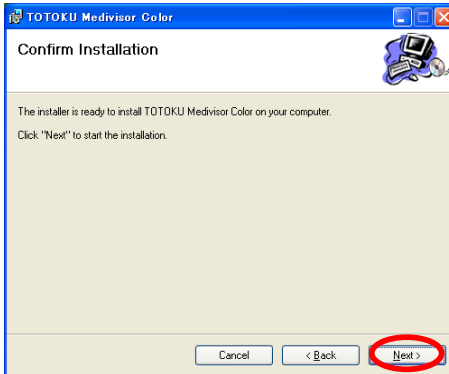
7. When the Installation Complete screen appears, click "Close" to complete installation. Remove the CD-ROM from the CD drive.
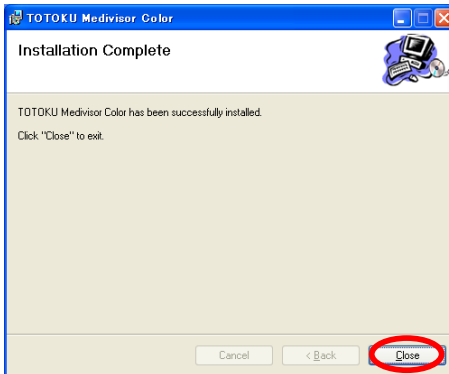
Important

In Windows 2000, the following message may appear at the end of installation. Click "OK" and restart the computer to complete installation.
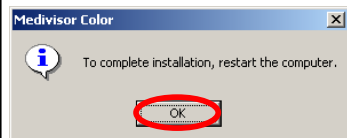
Before starting to use Medivisor Color...

Make sure to disable the color correction function on the graphics card prior to calibration (see 6.8), or proper calibration may not be performed.

3 Operations

This chapter explains the basic operations that Medivisor Color offers.

Start this software by selecting **TOTOKU>Medivisor Color>Medivisor Color** from the **Start** menu.

3.1 Setup

The **Setup** tab contains configuration settings for a subject display to be adjusted.

1. Select a subject display in the **Display** section on the **Setup** tab.

2. Select the communication port to which the display is connected in the **Communication Port** section.

3. Calibration sensor DTP94 should be selected in the **Calibration Sensor** section. If you are using CCL182 Series, CCL202, or CCL316 with Minolta USB sensor being installed, it should be listed in the drop-down menu.
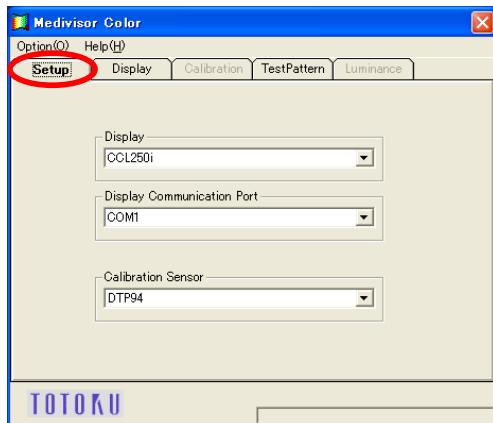
Important

Make sure to set up the **Setup** tab prior to calibration.

3.2 Display

When a daisy-chainable display is selected on the **Setup** tab, the **Display** tab appears. Select the **Display** tab, and all connected daisy-chainable displays will be detected in a few seconds. Select a subject display(s). Please note that operations explained in the remaining sections in Chapter 3 will be targeted at the displays selected here.
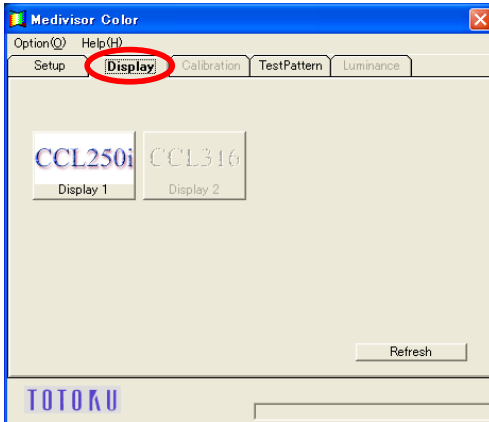
• Displays that cannot be daisy chained will not be detected.

• Daisy-chainable displays other than the one that was selected on the **Setup** tab, will also be detected, but cannot be selected.

• Click "Refresh" to re-establish connection.

• The Calibration tab will not become active until a display(s) is selected.

3.3 Calibration

3.3.1 Calibrating a display

Before starting to use this software, please close all other applications. Calibrate displays at least after 60 minutes of warm-up time, excluding the time during which the screen is blacked-out because of the power save function or the screensaver. Also, if the power save function is enabled, set the idle time to 30 minutes or longer, or disable it prior to calibration. If it activates during calibration, the display may not be calibrated properly.

1. Perform Sections 3.1 and 3.2.

2. When the subject display(s) is either CCL250i or CCL350i, the **Color Configuration** drop down list will appear. Select a location to save the calibration data.
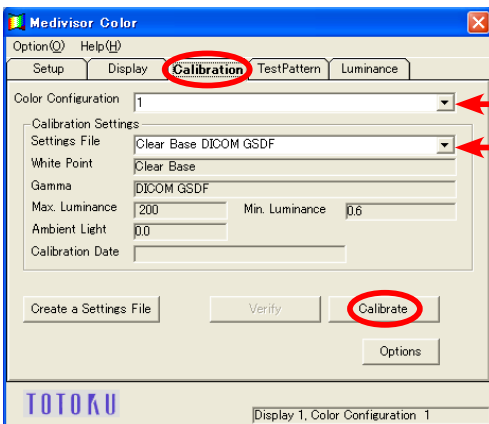
The **Color Configuration** drop down list appears only for CCL250i and CCL350i. These displays can save up to three sets of calibration data within the display. For example, two calibrations that are carried out based on "Clear Base DICOM GSDF" and "Blue Base DICOM GSDF" are saved as Color Configuration 1 and 2 respectively. By switching the color configurations, the display will be adjusted to the selected setting without calibrating it again.

3. Select a calibration setting from the **Settings File** drop down list.

4. Click "Calibrate," and the Cal Panel appears. Drag it on to the subject display and expand it to full-screen.

Measuring area
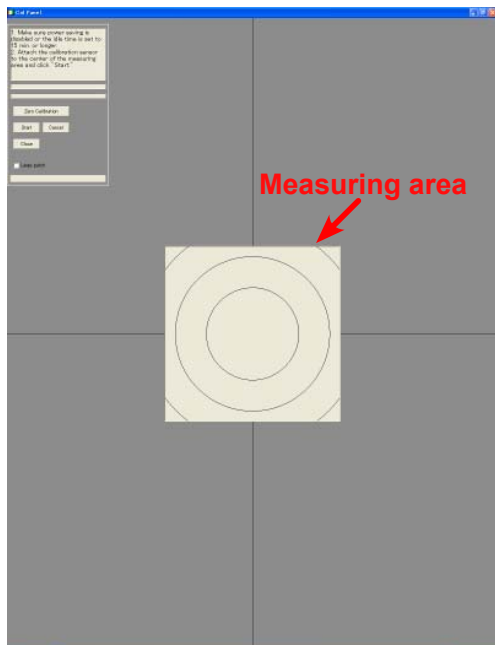
Once the Cal Panel is placed, it will be displayed on the same spot from the next time on.

5. Click "Zero Calibration" to zero calibrate the calibration sensor.
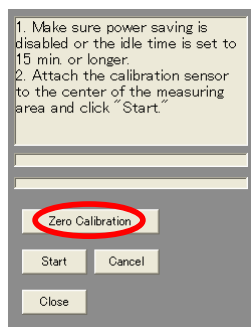
Important

Make sure to zero calibrate the sensor for accurate calibration of displays.

6. When the following message appears, lay the calibration sensor down on a dark and even surface so that no light leaks into the light sensitive area and click "OK."
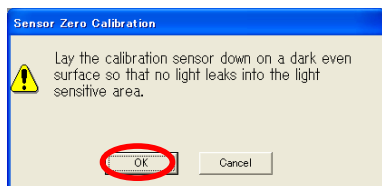
See 6.1 on how to attach the calibration sensor.

7. When zero calibration is done, one of the following messages appears. Click "OK." If zero calibration has failed, retry steps 5 and 6. If zero calibration fails the second time, restart this software.

MedivisorColor	MedivisorColor
The calibration sensor has been successfully zero calibrated.	⚠ Zero calibration failed.
[OK]	[OK]
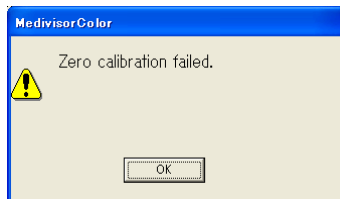
8. Attach the calibration sensor to the center of the measuring area on the Cal Panel and click "Start."

1. Make sure power saving is disabled or the idle time is set to 15 min. or longer.
2. Attach the calibration sensor to the center of the measuring area and click "Start."
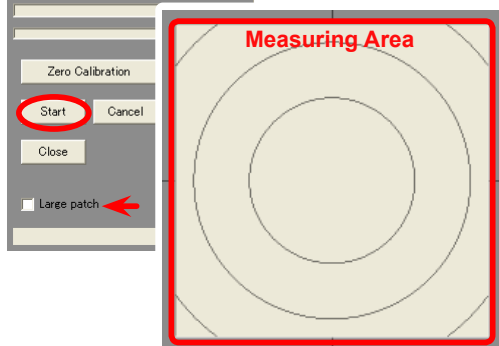
Zero Calibration
Start   Cancel
Close
☐ Large patch

Measuring Area

💡 Hint
• To minimize the margin of error, make sure to attach the sensor to the screen firmly (see 6.1). If the sensor does not stick to the panel surface well, tilt the panel up slightly and let the sensor sit on the surface.
• Check "Large patch" to enlarge the measuring area.

9. Comments on this calibration or the settings can be entered here. Click "OK" to start calibrating the display.

Comment
Current Color Configuration : 1

Enter comments regarding this calibration as necessary.

[OK]   [Cancel]

Comment
Current Color Configuration : 1
Enter a Color Configuration Name

Enter comments regarding this calibration as necessary.

[OK]   [Cancel]
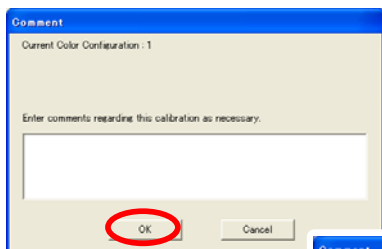
💡 Hint
• Comments will be included in the calibration history information (see 3.6).
• With CCL250i/CCL350i, the color configuration name can be customized.
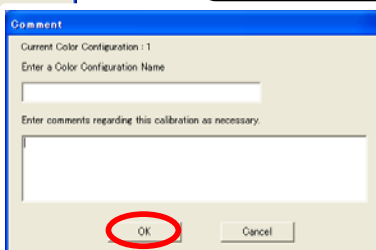
When "OK" is clicked without the calibration sensor being connected to the computer or attached to the measuring area, the following message appears. Click "Abort" to stop calibration. Check the connection of the calibration sensor, make sure it is attached properly, and restart calibration. If this message appears again, restart this software.
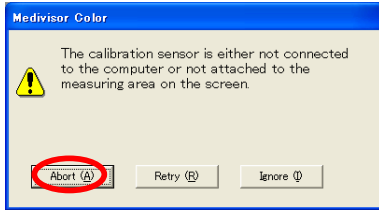
See 6.1 on how to attach the calibration sensor.

10. When calibration is complete, the Cal Panel disappears. Results are shown graphically in another window.
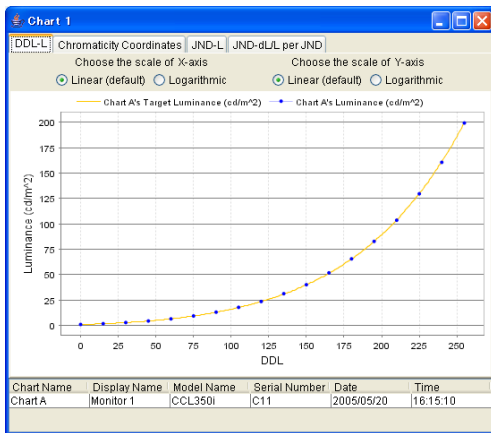
• The full line represents the target and the dots indicate the actual measurements.
• See 6.3 on how to read the graph.
• See 3.3.6 on how to apply this saved LUT data on the display.
• Use the Close button in the upper right corner of the screen to close the graph.

3.3.2 Calibration options

The calibration options allow you to fine-tune the calibration process. Set this up before starting calibration.

1. Click "Options" on the **Calibration** tab.
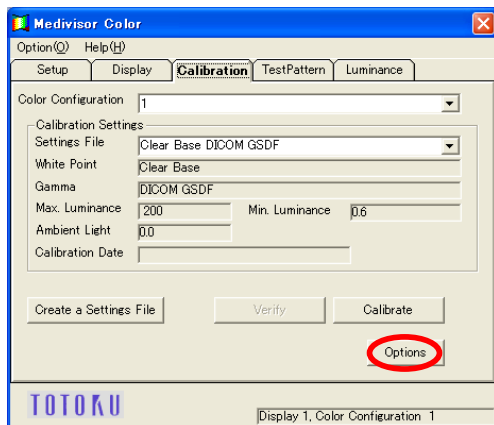
2. Make selections as you prefer and click "OK."
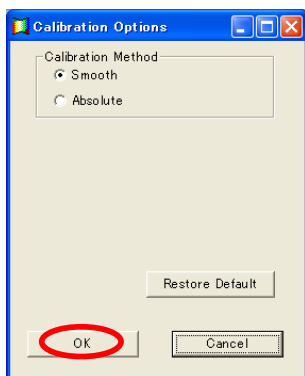
See 6.2 for more information.

3.3.3 Creating a calibration settings file

Calibration settings file can be created. Once created, it will be added to the Settings File drop-down menu on the **Calibration** tab for easy access.

1. Click "Create a Settings File" on the **Calibration** tab.
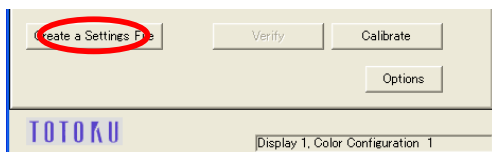
To modify an existing file, select the subject file from the **Settings File** drop down list. The Create a Settings File screen appears with the relevant information entered.

2. Select a color setting in the **White Point** section, set maximum and minimum luminance and ambient light (optional) in the **Luminance** section, select a gamma type in the **Gamma** section, and click "Save As." For more information on each item, see 6.4.
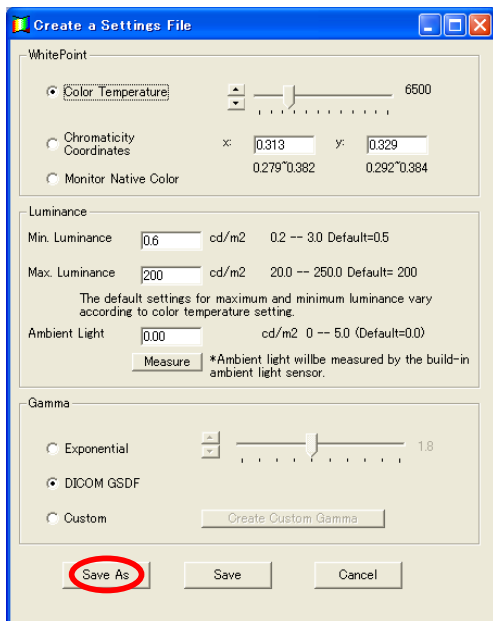
- Enter a value for **Ambient Light** only if it is known. Otherwise, use the default value.
- The Measure button under Ambient Light appears only when a display model that is mounted with the ambient light sensor is selected.
- When modifying an existing file, click "Save" to overwrite it.
- The default setting file cannot be overwritten. Trying to do so will disable the Save button.

3. Name the file and click "Save," and it will be saved with the **.csd** file extension in the Settings folder in the directory where Medivisor Color is installed.
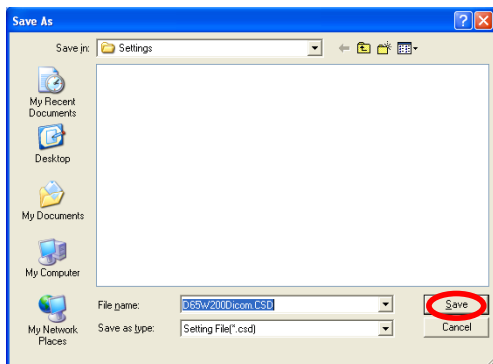
3.3.4 Creating custom gamma

You can create your own gamma file. Once created, it can be loaded easily.

1. Click "Create a Settings File" on the **Calibration** tab.
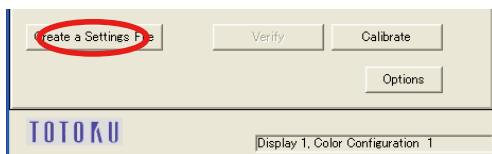
2. Select a color setting in the **White Point** section, select "Custom" and click "Create Custom Gamma" in the **Gamma** section.
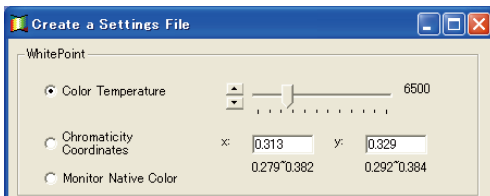
When "Custom" is selected, the **Luminance** section disappears and the settings become invalid. Set luminance in the next step.
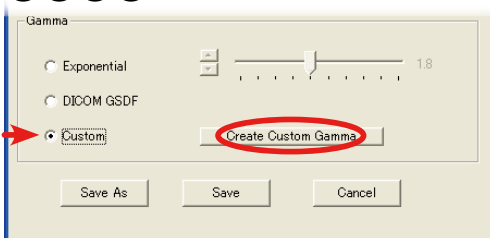
3. The following blank graph appears. Enter an input value in the **In** field within a range of 0 to 255, enter a corresponding luminance value in the **Out** field within a range of 0 to 250 (recommended), and click "Enter" to apply the values in the graph. Likewise, enter at least three sets of values and click "OK."
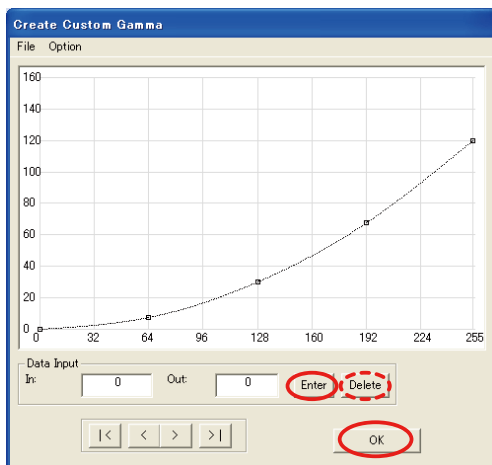
• The settable maximum value for the **Out** field is 300 cd/m^2 regardless of model, however each model has its own limit. Refer to the display user manual for the appropriate maximum value.

• Use the following buttons to select a coordinate.

• To delete a coordinate, select the subject coordinate and click "Delete."

The graph on the previous page is plotted based on the following sets of values.

In	0	64	128	192	255
Out	0	7.5	30	67.5	120

4. Select **File>Save** on the menu bar. Name the file and click "Save."
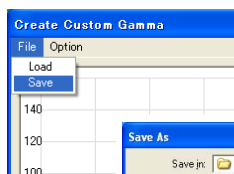
> Hint
> A saved gamma file can be loaded by selecting "Load."
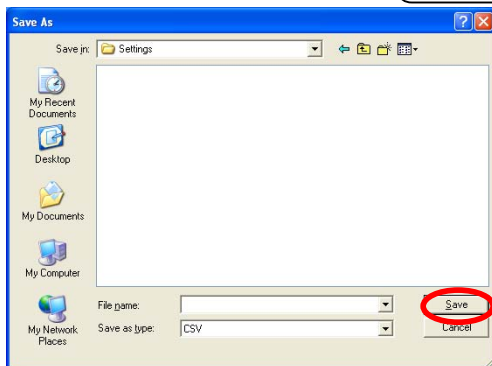
A gamma file consists of simple text data as follows.

```
[crvw]
0:0
64:7.5
128:30
192:67.5
255:120
```

Gamma files can also be created using an application like Microsoft Excel by saving in CSV format.
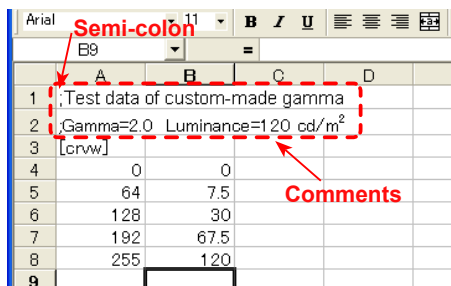
> Hint
> • Comments and notes can be included by placing a semi-colon (;) at the beginning of your notes.
> • Blank spaces before and after the numerical values are ignored.

I. Type as follows: **[crvw]**

II. Enter input and luminance values in pairs in separate cells. (If you are using an application other than Excel, insert a comma (,) or a colon (:) between each pair of values.)

III. Name the file, save it in CSV format, and store it anywhere.

3.3.5 Verifying the current display status

As for the displays that have previously been calibrated in the same system configuration, the current status of luminance and gamma can be evaluated against the latest calibration results.

1. Make sure the currently used settings file is selected in the **Settings File** field on the **Calibration** tab and click "Verify."
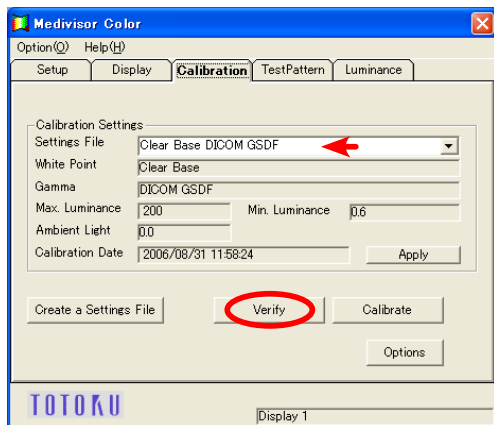

2. The Cal Panel appears. If necessary, zero calibrate the calibration sensor (see 3.3.1, Steps 5 - 7).

3. Attach the calibration sensor to the center of the measuring area on the Cal Panel and click "Start" to calibrate the display.
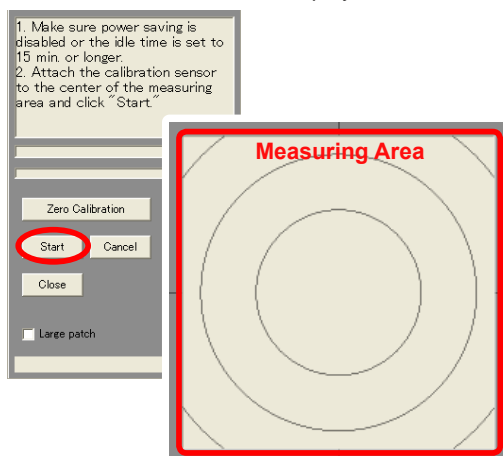
To minimize the margin of error, make sure to attach the sensor to the screen firmly (see 6.1). If the sensor does not stick to the panel surface well, tilt the panel up slightly and let the sensor sit on the surface.

4. When verification is completed, the Cal Panel disappears and results are shown graphically in another window.
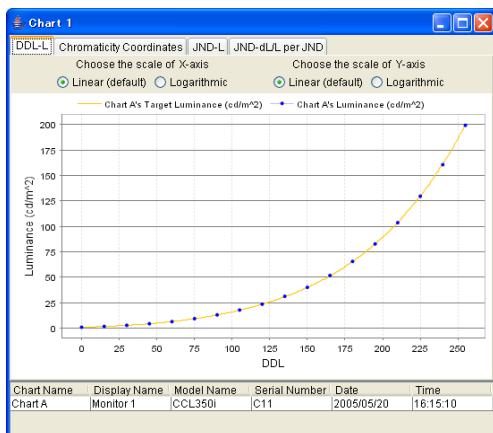
- It says that the full line represents the target luminance on the graph, however it actually shows the latest calibration result here. The dots indicate the actual measurements.
- See 6.3 on how to read the graph.
- Use the Close button in the upper right corner of the screen to close the graph.

3.3.6 Applying an LUT file

Calibration results are saved with the **.lut** file extension in the Settings folder in the TOTOKU Medivisor Color folder. You can reproduce the same condition on the display by applying the file.

Note: CCL250i and CCL350i are capable of saving three sets of calibration data within the display (see 3.3.1, Step 2). Thus, this method cannot be applied.

Select an LUT file in the **Settings File** field on the **Calibration** tab and click "Apply."
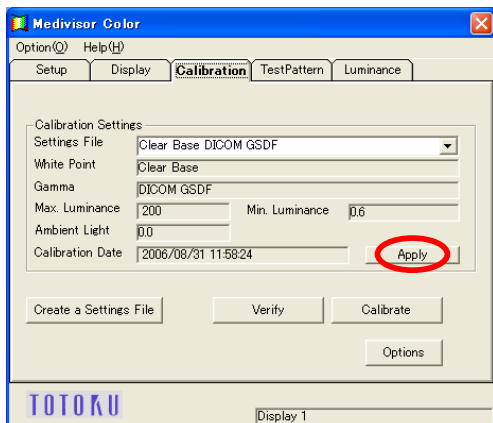
When an LUT file is applied on the same display as it was generated from, Medivisor Color can reproduce the condition successfully. However, if it is applied on another display, you may not get the same results.

3.3.7 Managing data files

• Settings files (files with the **.csd** file extension) and LUT files (calibration result files with the **.lut** file extension) are saved in the **Documents and Settings\User Name\ Application Data\TOTOKU Medivisor Color\Settings** folder (The user name will be replaced by the name used upon login.).

Note: The Application Data folder is usually hidden. Go to **Control Panel>Folder Options** and select "Show all hidden folders."

• LUT files are named with their corresponding displays' serial numbers. The serial number will be included as part of the device information at the bottom of the graph that appears after calibration or "Verify" is performed.

• When a file becomes unnecessary, delete it from the Settings folder.

For example: If settings file **D50W100G2.2.csd** become unnecessary, corresponding LUT file **D50W100G2.2.lut** will no longer be needed. Delete them both.

3.4 Test Pattern

The **Test Pattern** tab provides ten test patterns to visually check the performance of a calibrated display. For more information on the test patterns, see 6.5.
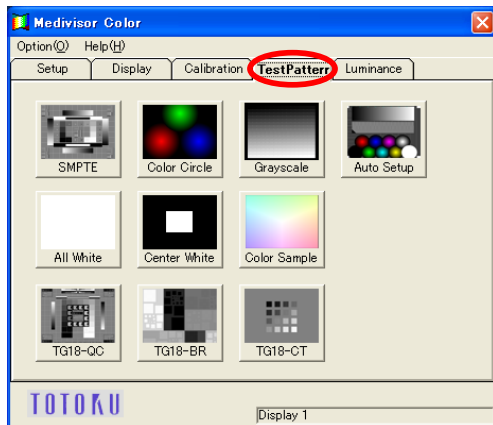
3.5 Luminance

The **Luminance** tab offers the option of adjusting luminance quickly without performing regular calibration. However, remember that gamma changes in concert with luminance.

Note: The **Luminance** tab is not available for displays with the luminance adjustment function in OSD.

1. Select the **Luminance** tab and click "Manual Luminance Adjustment."
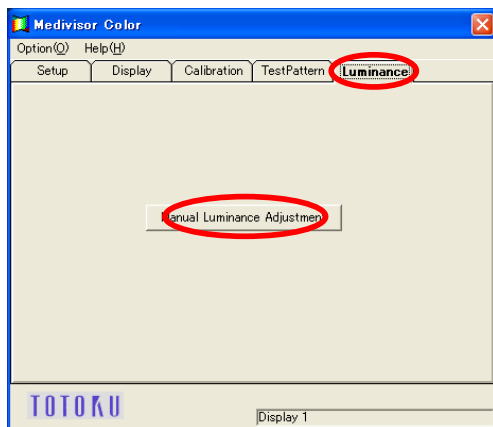
2. Adjust luminance using the scrollbar and click "Apply" to save and apply the adjusted luminance.
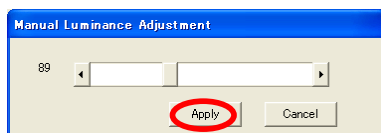
3.6 Calibration History

This function presents past calibration records both graphically and numerically for browsing and comparison.

● To see the detailed calibration information

1. Select **Options>Calibration History** on the menu bar.

2. Select a display in the **Calibration History** section, and the calibration records for the display appear below.

3. Select a record, and the detailed settings information appears in the **Calibration Settings** section.
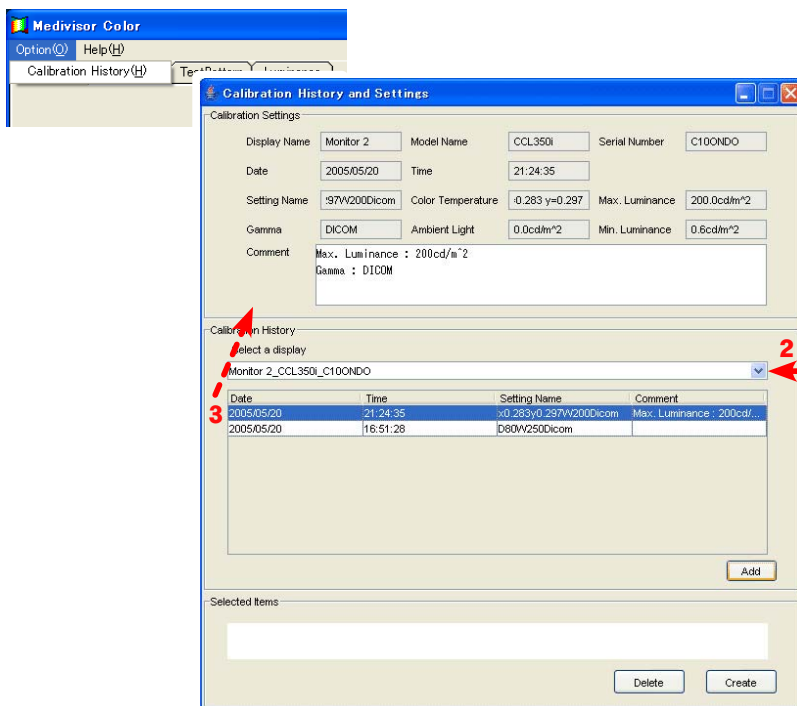
● To see the results graphically

1. Select a calibration record and click "Add," and it will be added to the **Selected Items** section. To compare with other records, select multiple records in the same way.

2. Click "Create."

3. The selected calibration records are shown graphically in another window.
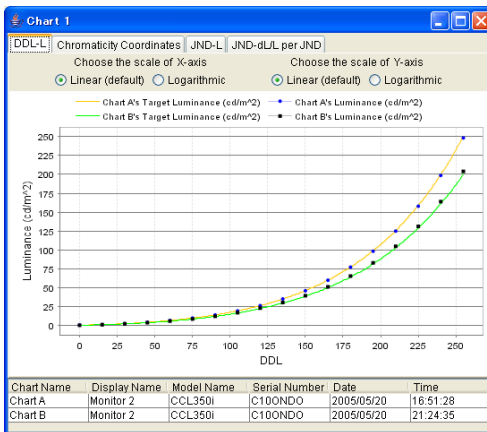
• See 6.3 on how to read the graph.

• Use the Close button in the upper right corner of the screen to close the graph.

4 Uninstallation

Select **Control Panel>Add/Remove Programs** from the **Start** menu and remove **TOTOKU Medivisor Color**. After uninstallation, settings files and calibration data files remain in **Documents and Settings\User Name\Application Data\TOTOKU Medivisor Color**. If these data files are not needed any longer, delete the TOTOKU Medivisor Color folder itself.

Note: The Application Data folder is usually hidden. Go to **Control Panel>Folder Options** and select "Show all hidden folders."

5 Troubleshooting

Problem 1: A communication error occurs upon startup of this software or during calibration.

Solution: The communication cable may not be connected properly. Check the connection (see 2.1). Also, make sure to shut down other applications to avoid the error before starting up this software.

> **Note:** When PM Medivisor is used together with this software, a communication error may occur. In that case, shutdown this software once and wait for a little while before restarting.

Problem 2: The calibration sensor DTP94 does not get recognized or an error message to this effect, such as "Calibration sensor is not ready," appears.

Solution: Depending on the computer, DTP94 does not get recognized when the computer is turned on with DTP94 being connected.

> **How to find out whether or not the calibration sensor is recognized:**
> 1. Right-click My Computer on the desktop and select "Properties."
> 2. When the System Properties screen appears, select the **Hardware** tab and click "Device Manager" in the **Device Manager** section in the middle of the screen.
> 3. The Device Manager screen appears. Click the + mark next to "USB (Universal Serial Bus) Controller" to expand it. If DTP94 is recognized, "X-Rite DTP94" should be listed; if it is not recognized, it says either "Unknown Device" or "USB Device."

> **How to get DTP94 recognized:**
> If DTP94 is detected as "Unknown Device" or "USB Device," reconnect DTP94 after the operating system started.

Problem 3: The set maximum luminance is not achieved through calibration.

Solution: change the **White Point** setting and try again. When **Gamma** is set to "DICOM GSDF," the target luminance is likely to be achieved in the order of "Native Color" > "Clear Base" > "Blue Base." Set Gamma to "Native Color" and recalibrate the display. If the target maximum luminance is not still achieved, age deterioration may be the cause for it. Consult your dealer.

6 Appendix

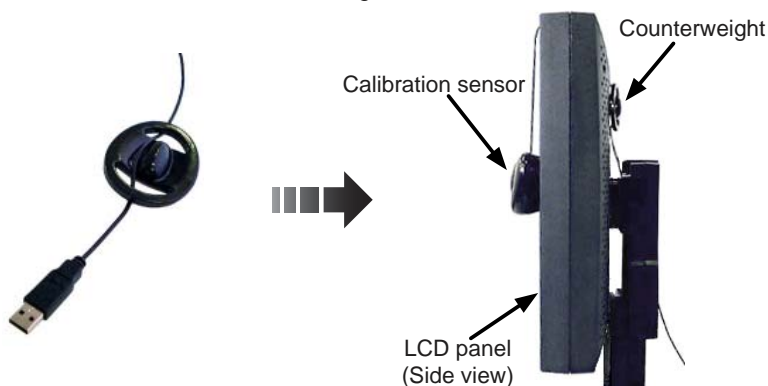## 6.1 How to attach the calibration sensor

1. Peel the paper off the adhesive gelatin pad (see the handling instructions below) and stick the smooth surface on the back of the calibration sensor so that the rough surface will be exposed as shown below. Peel the clear film off the rough surface.

Adhesive gelatin pad

Calibration sensor (on the back side)
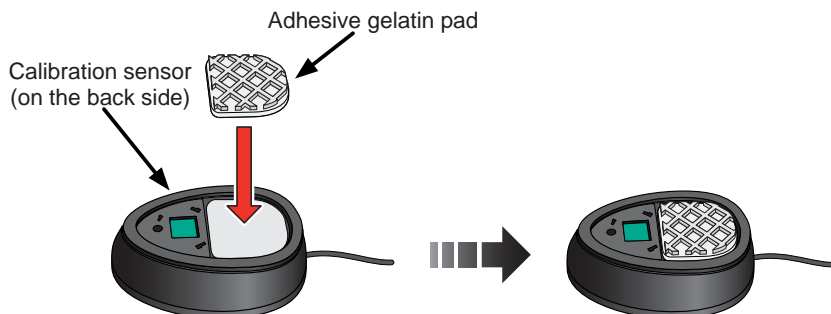
About the adhesive gelatin pad

Please note the followings in handling the adhesive gelatin pad:

- The gelatin pad is double-sided, self-adhesive, and reusable.
- When adhesion is lost, wash it with water or wipe it off with diluted mild detergent.
- Do not rip it off. Peel off slowly. It is very stretchy.
- Keep it out of direct sunlight as it will degrade.
- Wipe the calibration sensor to remove dust and grease before sticking the gelatin pad to it.
- The gelatin pad is not food. Do not lick or eat it. Do not stick it on the human body.

2. Run the calibration sensor's USB plug through the counterweight: The counterweight is oval-shaped with one end being narrower than the other. Put the USB plug through the smaller opening first, and then run it through the bigger opening so that the wider end comes on the bottom when it is hung.

Counterweight

Calibration sensor

LCD panel (Side view)

3. Attach the calibration sensor to the center of the measuring area by adjusting the position of the counterweight on the cord. Be careful not to damage the panel surface with either the calibration sensor or the counterweight.
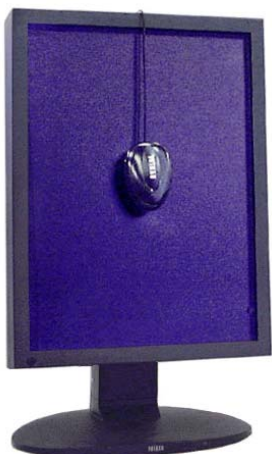
Note
Keep the LCD panel at the same tilt angle as it is in use. Do not further tilt or straighten the panel for calibration.

6.2 Calibration Options

Calibration Method
• **Smooth:**
When this is selected, Medivisor Color calibrates the display, taking into account the darkest possible black on the display, so that gradation appears smooth drawing a shallow curve on the graph and bringing out subtle differences in luminance in the dark areas. Unless otherwise required, select this.

• **Absolute:**
When this is selected, Medivisor Color tries to calibrate the display exactly to the target luminance. When the darkest possible black for a display is brighter than the target, there will be little difference in luminance among black and near-black colors. Each point on the graph is connected with a straight line.

6.3 How to read the graphs

DDL-L

Where X-axis is DDL, Y-axis is luminance. You can choose the scale of the axis between linear (default) and logarithmic. The full line represents the target and the dotted line indicates the actual measurement.
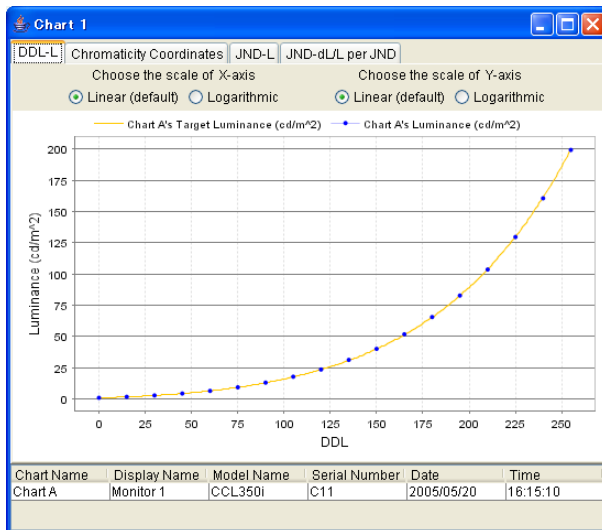

Chromaticity Coordinates
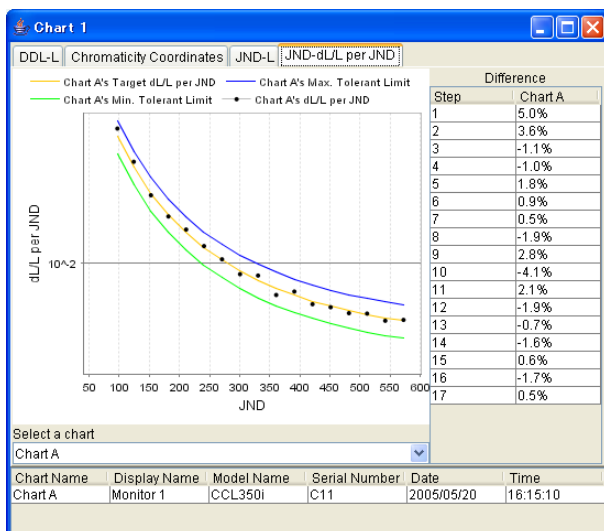
Where X-axis is DDL, Y-axis is color coordinates x and y. The graph shows only the actual measurements.
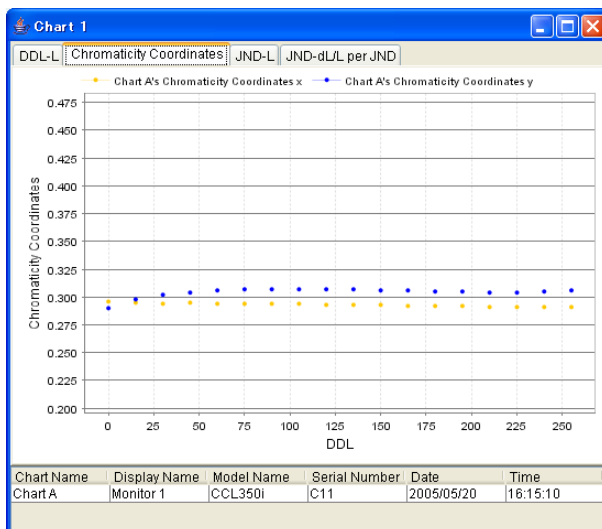
JND-L

Where X-axis is JND, Y-axis is luminance either on a linear (default) or a logarithmic scale. The full line represents the target and the dotted line indicates the actual measurement.

Note: This graph is only available for CCL205i and CCL350i when they are calibrated to the DICOM GSDF.
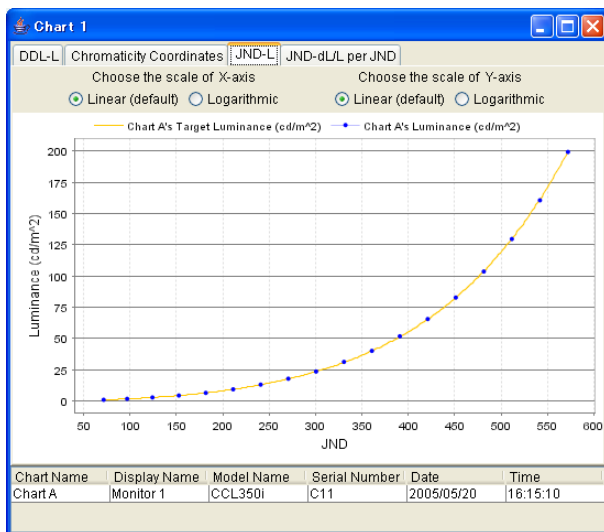
JND-dL/L per JND

Where X-axis is JND (linear scale), Y-axis is dL/L per JND (logarithmic scale). The full line represents the target and maximum and minimum allowable limit and the dotted line indicates the actual measurement.
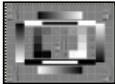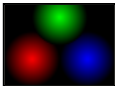
**Note:** This graph is only available for CCL205i and CCL350i when they are calibrated to the DICOM GSDF.

6.4 Create a Settings File

Item		Explanation
White Point	**Color Temperature**	Setting range: 4000 to 15000 in Kelvin • **5000K**: Warm reddish tone commonly used in the print industry • **6500K**: Commonly used for TVs • **9300K**: Cold bluish tone typically used on displays for crisp and vivid colors
	Chromaticity Coordinates	Setting range: x=0.279~0.382, x=0.292~0.384 (x=0.346, y=0.359) equals to 5000K (x=0.313, y=0.329) equals to 6500K (x=0.283, y=0.297) equals to 9300K xy chromaticity coordinates are correlated with color temperature. You can set color temperature first and fine-tune with xy values.
	Display Native Color	A setting that employs the display's native color while luminance and gamma will be calibrated
Luminance	**Max. Luminance**	The targeted brightest luminance. See the display's specifications. Setting range: 80~250 cd/m^2 Due to degradation in backlight luminance of the LCD panel, results may not match the target luminance.
	Min. Luminance	The targeted darkest luminance. Ideally it should be 0.0 cd/m^2, however LCD panels cannot block the backlight completely; minimum luminance of an LCD panel usually reads around 0.3 to 1 cd/m^2. To make black appear properly, set 0.0 cd/m^2 and select "Smooth" when calibrating.
	Ambient Light (Optional)	The effects of ambient light. Default: 0.0 cd/m^2 Enter a value only if it is known. Otherwise, use the default value. The Measure button appears when the subject display(s) is CCL350i or CCL250i. They have a built-in ambient light sensor. Click the button to measure and enter the value.
Gamma	**Exponential**	Display's luminance is determined by the equation: $y=x^n$, where y is luminance, x is the input video signal, and n is the exponential power. Assign a value for n.
	DICOM GSDF	A standard display function for grayscale images called Grayscale Standard Display Function (GSDF) defined by the Digital Imaging and Communications in Medicine (DICOM) standard and based on Barten's model of the human visual perception. DICOM GSDF realizes a consistent image display on display devices with varying characteristics.
	Custom	User-defined gradation characteristics

6.5 Test Patterns

Pattern	Name	Explanation
	SMPTE	Commonly used pattern on medical image display devices (see 6.6).
	Color Circle	Useful to check for a smooth gradation of red, green, and blue.
	Grayscale	Useful to check for a smooth transition from black to white (see 6.7).
	Auto Setup	Use this pattern to run OSD Auto Size when displays have analog input.
	All White	Useful to check color and luminance uniformity.
	Center White	Useful to check luminance.
	Color Sample	Useful to measure colors or match colors with adjacent displays.
	TG18-QC	Useful to visually and quantitatively assess resolution, luminance, and geometric distortion.
	TG18-BR	Useful to visually and quantitatively assess the fine details in low contrast image structures.
	TG18-CT	Useful to visually and quantitatively assess luminance response.

6.6 SMPTE Pattern
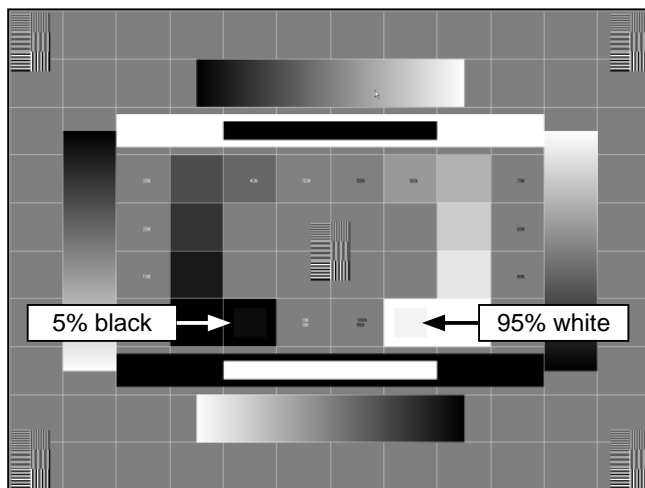
Grayscale:
The middle section of the pattern contains gray levels from 0% to 100% in increments of 10%. You can check the smoothness or continuity of grayscale. Check if there is:

- clear distinction between 100% and 95% whites (The small 95% square within the 100% white square should be visible.), and
- clear distinction between 0% and 5% blacks (The small square within the 0% black square should be visible.).

Resolution:
Each line in vertical and horizontal stripes in the squares in the center and four corners should be distinguishable.
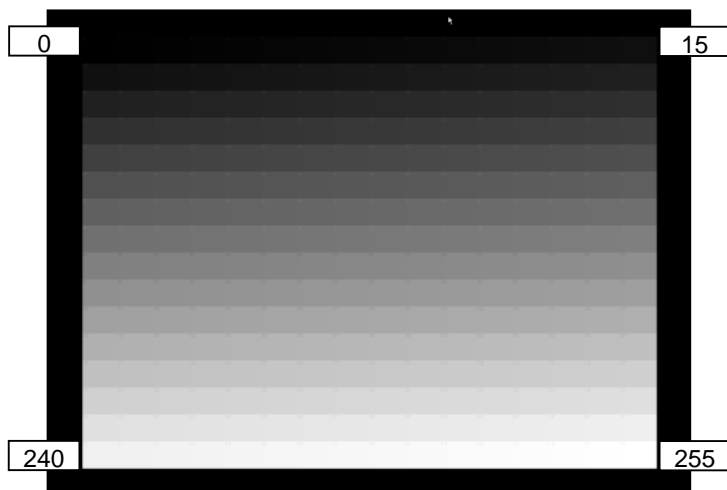
Linearity:
Check for distortion and misalignment using the grids across the screen.

Video Characteristics:
Check for streaking in and around the white and the black rectangles.

6.7 Grayscale Pattern

The grayscale pattern consists of 16 rows and columns containing 256 gray levels from black (0) to white (255). The table below shows what grayscale level each cell represents.

0	1	2	…	…	14	15
16	17	18	…	…	30	31
32	33	34	…	…	46	47
…	…	…	…	…	…	…
224	225	226	…	…	238	239
240	241	242	…	…	254	255

6.8 Graphics Card Settings

Some graphics cards have a built-in color correction function. Make sure to disable it prior to calibration. The following instructions are for setting TOTOKU LV22P2.

1. Select **Control Panel>Display** from the **Start** menu or right-click the screen and select "Properties."

2. Select the **Settings** tab and click "Advanced."
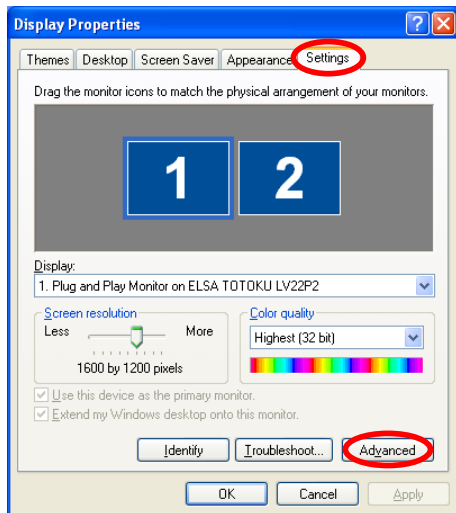
3. Select the **Quadro NVS 280 PCI** tab, and the popup menu appears. Select "Color Correction."
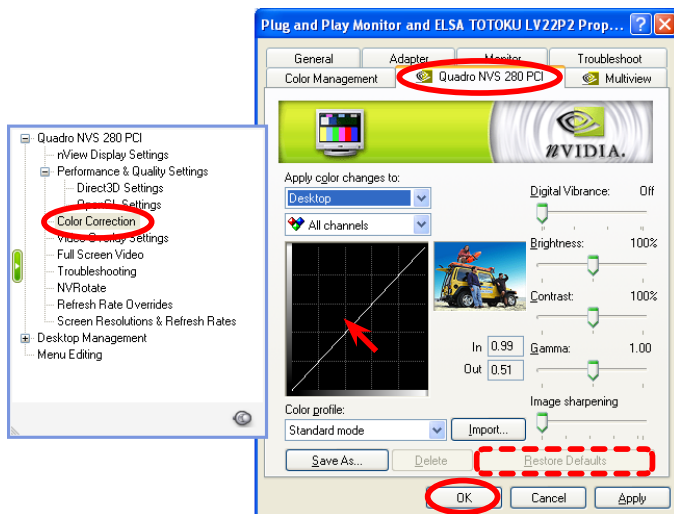
4. A graph that decides video output appears. Reset the curve into an upward straight line or click "Restore Defaults" and click "OK."